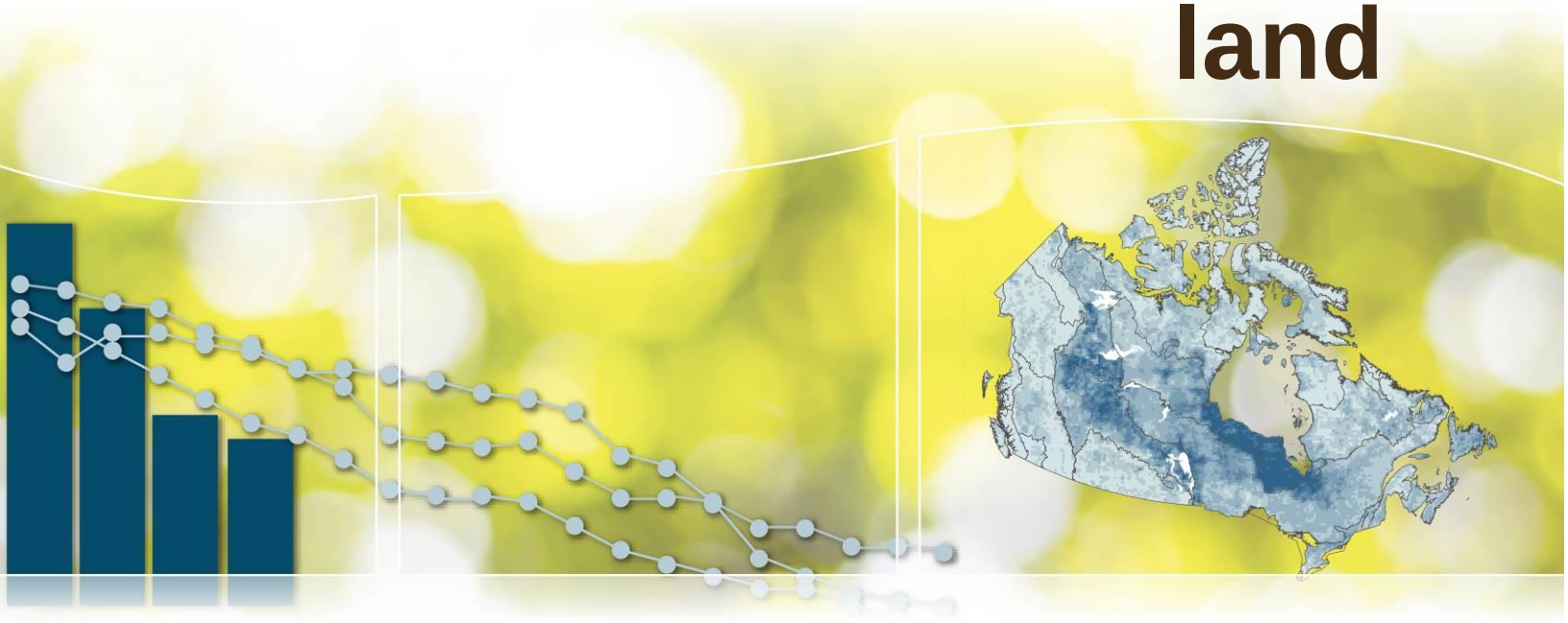
Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canadian Environmental Sustainability Indicators

Wildlife habitat capacity on agricultural land



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Canadian Environmental Sustainability Indicators

Wildlife habitat capacity on agricultural land

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Wildlife habitat capacity on agricultural land

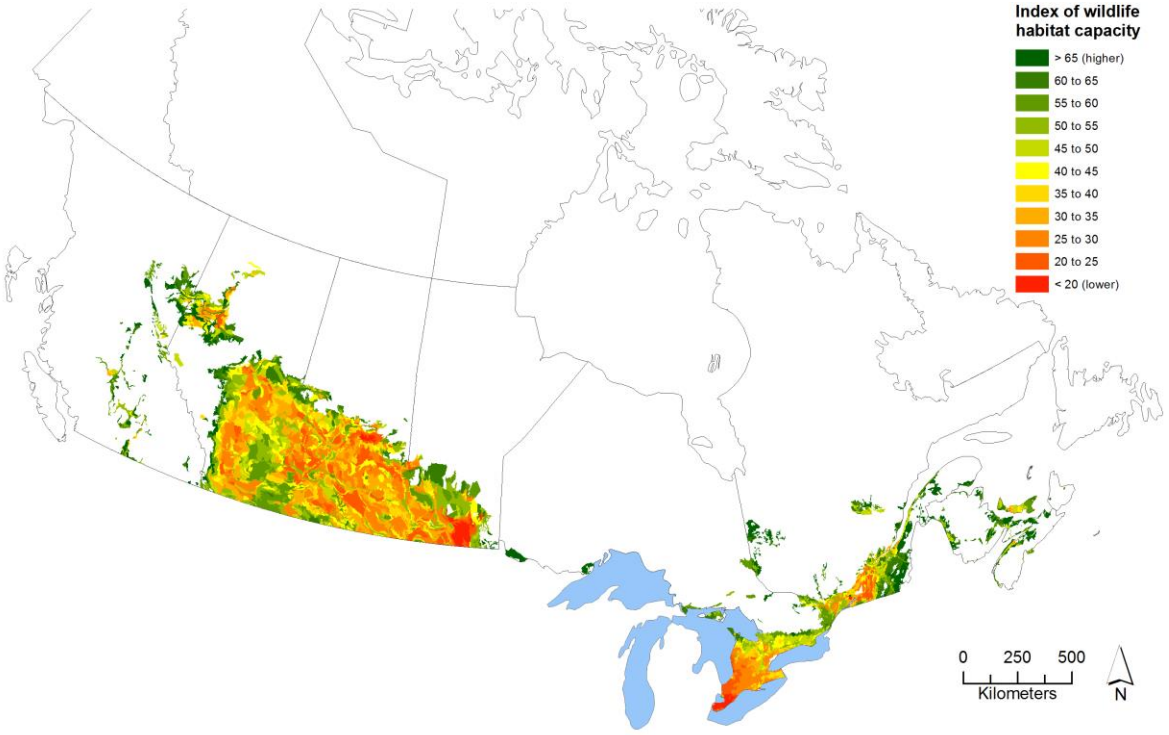
Wildlife habitat capacity is the extent and quality of habitat that can support a diversity of species. When we convert wilderness to agricultural land we lose a great deal of wildlife habitat capacity. However, we can manage agricultural land to regain some of this capacity. Agricultural land includes not only fields for food production but also other types of land cover. Wooded areas, wetlands, shoreline areas and natural pastures on agricultural land are important habitats for wildlife. The indicator shows how well habitat is maintained while producing the food we need.

Key results

In 2017,

- in western Canada, wildlife habitat capacity is generally higher in British Columbia than in the prairies with the exception of the Fraser Valley
- in eastern Canada, southwestern Ontario and the greater Montreal area have the lowest wildlife habitat capacity

Figure 1. Index of wildlife habitat capacity on agricultural land, Canada, 2017



Data for Figure 1

View western Canada

View eastern Canada

Note: Habitat capacity is measured as the ability of the landscape to support breeding and feeding for wild terrestrial vertebrates (see methods). Relative habitat capacity is shown as a gradient from higher (green), for areas of high habitat capacity, to lower (red), for areas of lower habitat capacity.
Source: Agriculture and Agri-Food Canada (2018).

In British Columbia, agricultural land is generally restricted to mountain valleys and consists of a significant amount of rangeland. This includes unimproved pasture (natural grazing lands) that has a relatively high wildlife habitat capacity.

In the Prairies, there is a high proportion of cropland (fields) to total agricultural land.[1] This results in a small proportion of natural and semi-natural cover on agricultural lands and contributes to the lower index of wildlife habitat capacity for the Prairies.

The lower index of wildlife habitat capacity in eastern Ontario and southern Quebec is due to 2 things. First, there is a relatively small proportion of natural and semi-natural land cover on agricultural land. Secondly, pasture and forage land has recently been converted to annual crops, which has a lower wildlife habitat capacity.

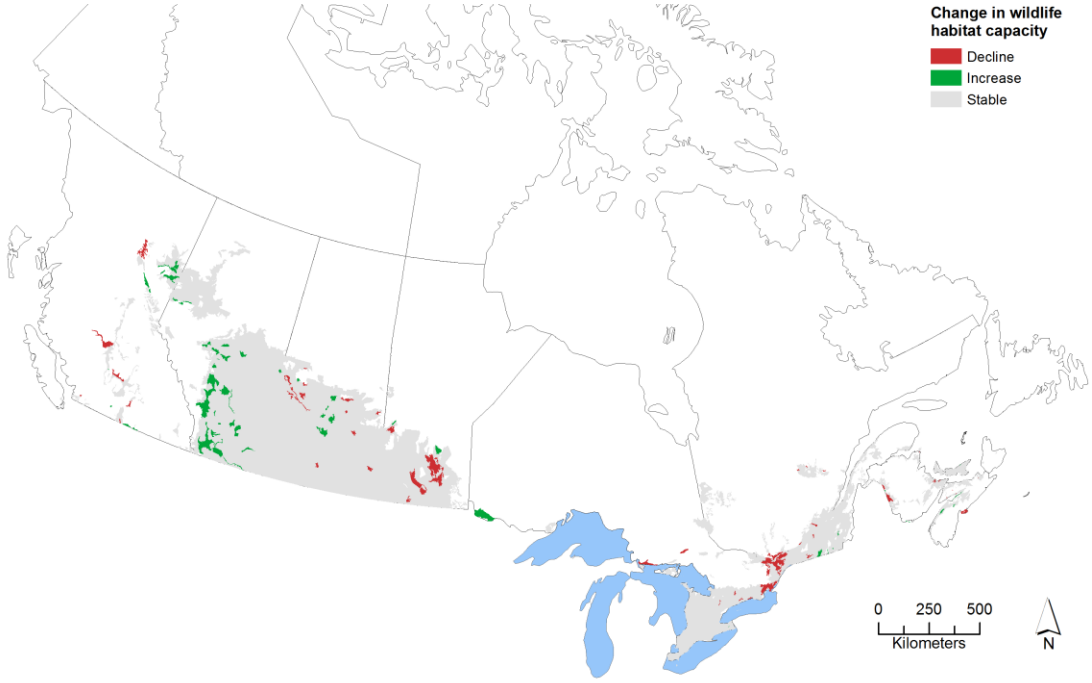
Wildlife habitat capacity is relatively high in much of Atlantic Canada with the exception of parts of Prince Edward Island. Agriculture in Atlantic Canada is mostly mixed farming with greater amounts of natural and semi-natural land cover.

Change in wildlife habitat capacity on agricultural land

Key results

- On average, wildlife habitat capacity on agricultural land has seen little change since 2011
- Where it changed, it increased in a slightly larger area (3.4% of agricultural land) than it declined (3.1% of the area)

Figure 2. Change in wildlife habitat capacity on agricultural land, Canada, 2011 to 2017



Data for Figure 2

View western Canada

View eastern Canada

Source: Agriculture and Agri-Food Canada (2018).

[1] Clearwater, R. L., T. Martin and T. Hoppe (2016) Environmental sustainability of Canadian agriculture: Agri-environmental indicator report series – Report #4. Agriculture and Agri-Food Canada. Retrieved on September 19, 2018.

Between 2011 and 2017, the wildlife habitat capacity in the western Prairies increased. The increase is associated with a shift in crop type from grain to pastures and hay. Pastures and hay support more wildlife species for breeding and food supply than grain.

During the same period, the wildlife habitat capacity in the eastern Prairies declined. The decline is associated with a shift from pastures and hay to annual crops such as soybean, grain and oilseeds.

Between 2011 and 2017, there was an overall decline in wildlife habitat capacity in eastern Canada. The greatest amount of decline occurred within the St. Lawrence Lowlands. The decline in eastern Canada is associated with an expansion of agricultural fields resulting in the loss of natural and semi-natural cover.

About the indicator

What the indicator measures

The Wildlife habitat capacity on agricultural land indicator calculates the relative value of farmland for wildlife. In particular, different types of vegetation and land cover are assessed using 2 factors:

1) the number of vertebrate species that can use that habitat type for breeding or feeding weighted by

2) habitat values related to the importance of the habitat type for each species based on the scientific literature and ecology researchers[2]

The Wildlife habitat capacity on agricultural land indicator provides an assessment of the status and the general changes in the potential of the Canadian agricultural landscape to provide suitable habitat for terrestrial birds, mammals, reptiles, and amphibians.

Why this indicator is important

Canada's agricultural landscape is comprised of cultivated and grazing land with associated rivers and streams, wetlands, woodlands and natural grasslands. These habitats support many birds, mammals, reptiles, and amphibians. Many of these and other species only occur in regions that are also suitable for farming.

As land managers, agricultural producers play a role in sustaining biodiversity. The management and land use decisions they make can have a negative or positive effect on wildlife. Conversion of natural landscapes and changes in land use (such as wetland drainage, cultivation of natural lands, overgrazing, and the loss and fragmentation of forest cover) negatively affect wildlife. Conversely, conservation tillage, planting shelterbelts, responsible grazing, and buffering watercourses help sustain biodiversity.

Sustainable food

This indicator supports the measurement of progress towards the following 2016–2019 Federal Sustainable Development Strategy long-term goal: Innovation and ingenuity contribute to a world-leading agricultural sector and food economy for the benefit of all Canadians. It is used to assess progress towards the target: By 2030, agricultural working landscapes provide a stable or improved level of biodiversity and efficient management towards water and soil quality for food production.

[2] Javorek SK, Antonowitsch R, Callaghan C, Grant M and Weins T (no date) AEI Technical Supplement, Wildlife Habitat on Farmland: Methodology. (PDF; 44.7 kB) Retrieved on September 19, 2018

The indicator also contributes towards reporting on Target 7 of the 2020 Biodiversity Goals and Targets for Canada: "By 2020, all agricultural working landscapes provide a stable or improved level of biodiversity and habitat capacity."

Related indicators

The Extent of Canada's wetlands indicator reports on the extent of this ecosystem that supports a large number of species.

The Risk to soil and water quality from agriculture indicators show the changing influence of agriculture on 2 aspects of environmental integrity – clean water and healthy soils.

The Canadian species index indicator tracks average population trends for vertebrate species in Canada and is a proxy to measure overall biodiversity trends.

The Status of wild species indicators provide a measure of extinction risk and an indication of the overall state of biodiversity in Canada.

Data sources and methods

Data sources

Fine-grained land use data (30-meter resolution) are developed by Agriculture and Agri-Food Canada for Canada's agricultural ecumene. These are combined with information on species' habitat needs.

More information

Different types of data are combined to model habitat suitability.

- Land cover data: Agriculture and Agri-Food Canada Annual Crop Inventory
- Species ranges
    - Birds: BirdLife International Species distribution maps
    - Mammals: Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0.
    - Amphibians: Digital Distribution Maps of the World's Amphibians.
    - Reptiles: Red List Spatial Data Download
- Habitat use: Information was gathered from a review of scientific literature and expert opinion. Habitat suitability matrices were then developed for wildlife species associated with farmland habitat.[3]
- Analysis framework: Soil Landscapes of Canada polygons clipped to Coastal Waters (polygons), Boundaries files – 2016 Census.

[3] Javorek SK, Antonowitsch R, Callaghan C, Grant M and Weins T (no date) AEI Technical Supplement, Wildlife Habitat on Farmland: Methodology. (PDF; 44.7 kB) Retrieved on September 19, 2018.

Methods

To construct the indicator, a habitat association matrix was used to link 558 terrestrial vertebrate species associated with agricultural land in Canada to 17 land cover categories[4] that tracked consistently among reporting years.

More information

Land cover categories used for analysis were wetland/water, exposed land, woodland/shrubland, urban, pasture/grassland/hay, agriculture undifferentiated, summerfallow, cereals, corn, oilseeds, soybeans, pulses, vegetables, fruits, berries, sod and other crops.

Agricultural land was defined as all soil landscapes of Canada polygons (the reporting unit for the indicator) that contained greater than 5% agriculture.

Potential wildlife habitat capacity was determined by:

1. Calculating species-specific habitat availability for reproduction and feeding (percent of the soil landscapes of Canada that satisfied these life history requirements).
2. Calculating the average of species-specific habitat availabilities for all terrestrial vertebrates with year-round/summer occurrence within a soil landscapes of Canada polygon.
3. Applying linear regression to detect significant changes in potential wildlife habitat capacity for each soil landscapes of Canada polygon.

Recent changes

Because data collection has been consistent and exhaustive over the years from 2011 to 2017, it is now possible to report short-term changes at a fine level of detail.

The colour scheme used for the index of wildlife habitat capacity was revised and is different from the August 2016 publication. This was done to improve the contrast and ease of distinguishing higher versus lower habitat capacity.

The analysis uses data from the Annual Crop Inventory, which had additional geographical areas added in 2013. Only areas that had data for all of the years 2011 to 2017 were included in the change analysis and shown on the index of wildlife habitat capacity figure.

The change analysis for the August 2016 publication used data from the Canadian Census of Agriculture, a less precise data source and cannot be directly compared to the index and changes in the current publication.

Caveats and limitations

Wildlife habitat capacity is modelled with the best available information, which does not capture all the details which may affect the ability of an area to support wildlife species. In addition, all geographic information products contain some error, and the habitat needs of some species are better known than others. The result should be seen as an indication of the landscape's ability to support wildlife, rather than as a precise measure.

[4] From Agriculture and Agri-Food Canada Earth Observation Based Annual Crop Inventory, 30-meter pixel resolution.

More information

Habitat capacity is for terrestrial vertebrate species only. For these species, only 2 categories of habitat use are considered: breeding (nesting, reproduction) and feeding (foraging). Other needs, such as water, hiding from predators, resting, roosting, and basking are not included. Habitat use is only considered for the summer season, meaning wintering habitat and use during migration are not included.

The indicator deals only with the quantity of habitat and does not address quality, habitat fragmentation or the influence of landscape pattern (composition and configuration) on wildlife.

Data may be missing for some areas in some years. Areas classified as "Too wet to seed" in the Annual Crop Inventory cannot be assigned to a land-use class.

Results should not be compared to previous editions of this indicator. Relative habitat capacity is shown using a new colour scale which shows the variability more clearly.

Before 2011, calculation of the indicator was limited by the lack of detailed national land cover data in the Canadian census of agriculture. Spatial and temporal estimates of the diverse habitats contained in the census' "All Other Land" category was not possible.

Resources

References

Clearwater RL, Martin T and Hoppe T (2016) Environmental sustainability of Canadian agriculture: Agri-environmental indicator report series – Report #4. Agriculture and Agri-Food Canada. Retrieved on September 19, 2018.

Javorek SK, Antonowitsch R, Callaghan C, Grant M and Weins T (no date) AEI Technical Supplement, Wildlife Habitat on Farmland: Methodology. (PDF; 44.7 kB) Retrieved on September 19, 2018.

Javorek SK and Grant MC (2011) Technical Thematic Report No. 14. – Trends in wildlife habitat capacity on agricultural land in Canada, 1986-2006. Retrieved on September 19, 2018.

Neave P and Neave E (1998) Habitat and Habitat Availability Indicator. Agri-Environmental Indicator Project. Agriculture and Agri-Food Canada.

Related information

An Overview of the Canadian Agriculture and Agri-Food System 2017

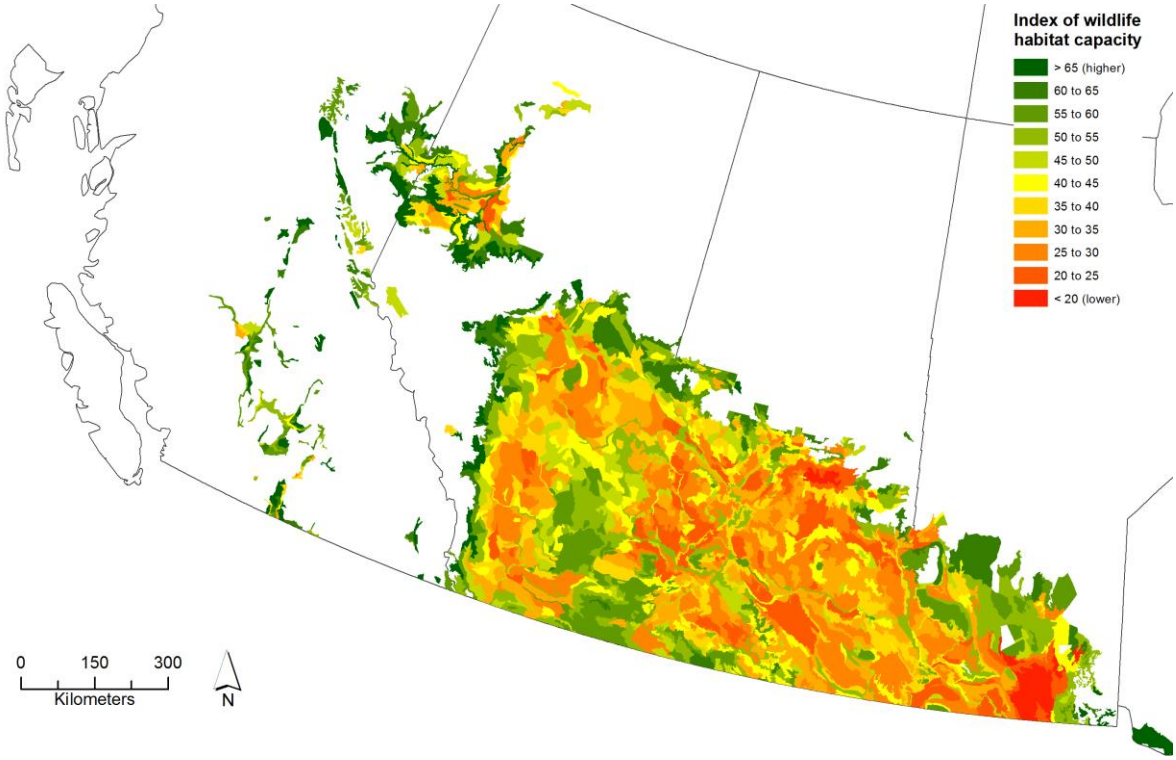
Discover Agriculture

We Grow a Lot More Than You May Think

Annex

Annex A. Index of wildlife habitat capacity, regional figures

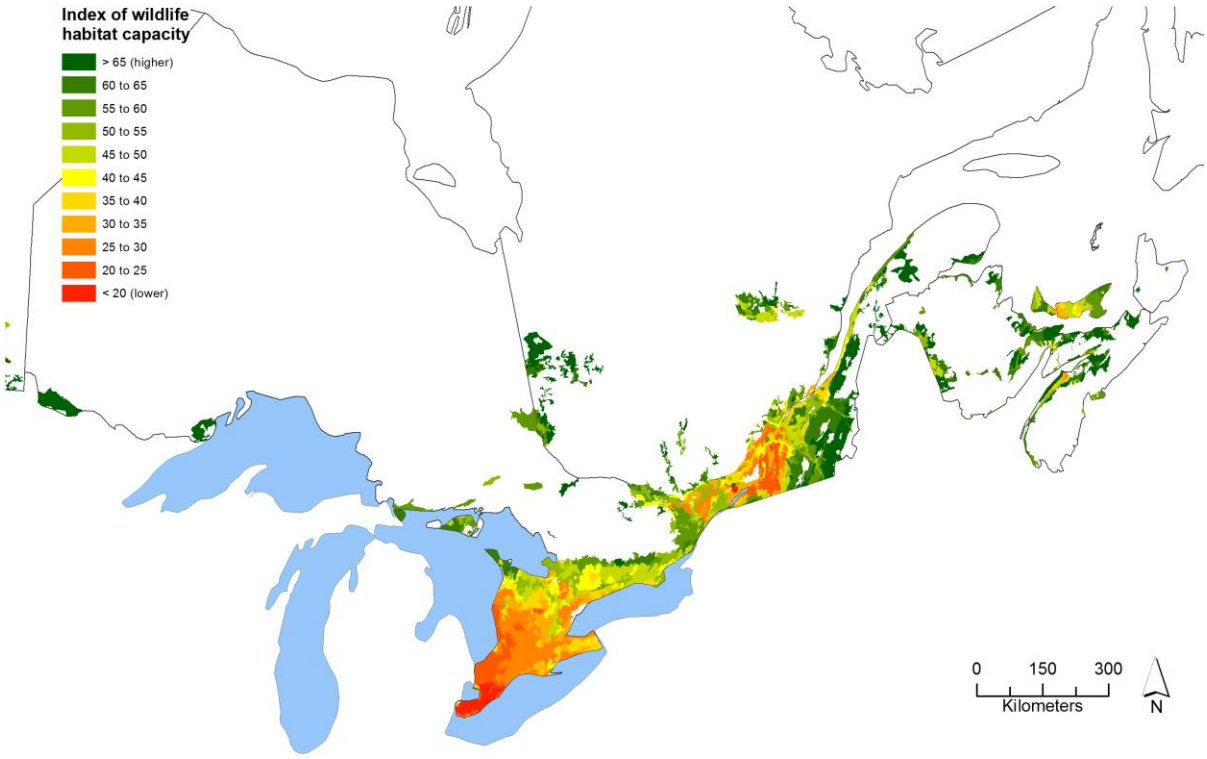
Figure A.1. Index of wildlife habitat capacity, western Canada, 2017



Return to Figure 1

Note: Habitat capacity is measured as the ability of the landscape to support breeding and feeding for wild terrestrial vertebrates (see methods). Relative habitat capacity is shown as a gradient from higher (green), for areas of high habitat capacity, to lower (red), for areas of lower habitat capacity.
Source: Agriculture and Agri-Food Canada (2018).

Figure A.2. Index of wildlife habitat capacity, eastern Canada, 2017



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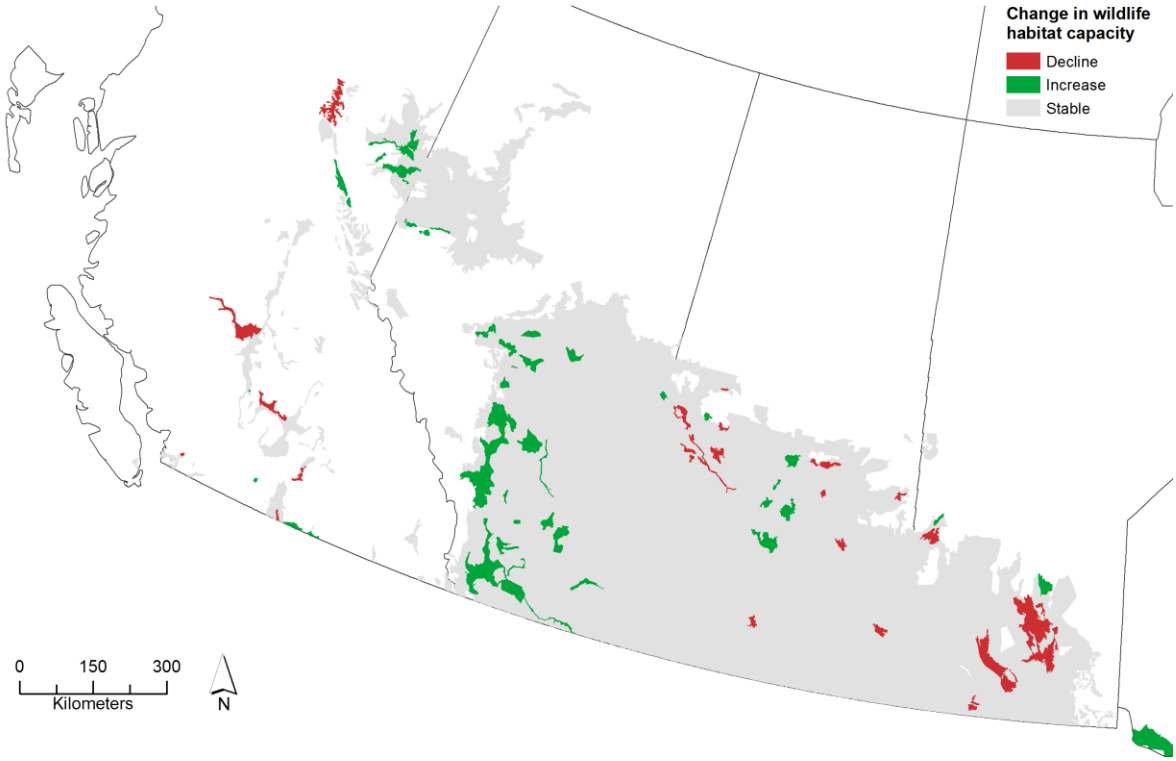
Note: Habitat capacity is measured as the ability of the landscape to support breeding and feeding for wild terrestrial vertebrates (see methods). Relative habitat capacity is shown as a gradient from higher (green), for areas of high habitat capacity, to lower (red), for areas of lower habitat capacity.
Source: Agriculture and Agri-Food Canada (2018).

Annex B. Change in wildlife habitat capacity, regional figures

Figure B.1. Change in wildlife habitat capacity, western Canada, 2011 to 2017



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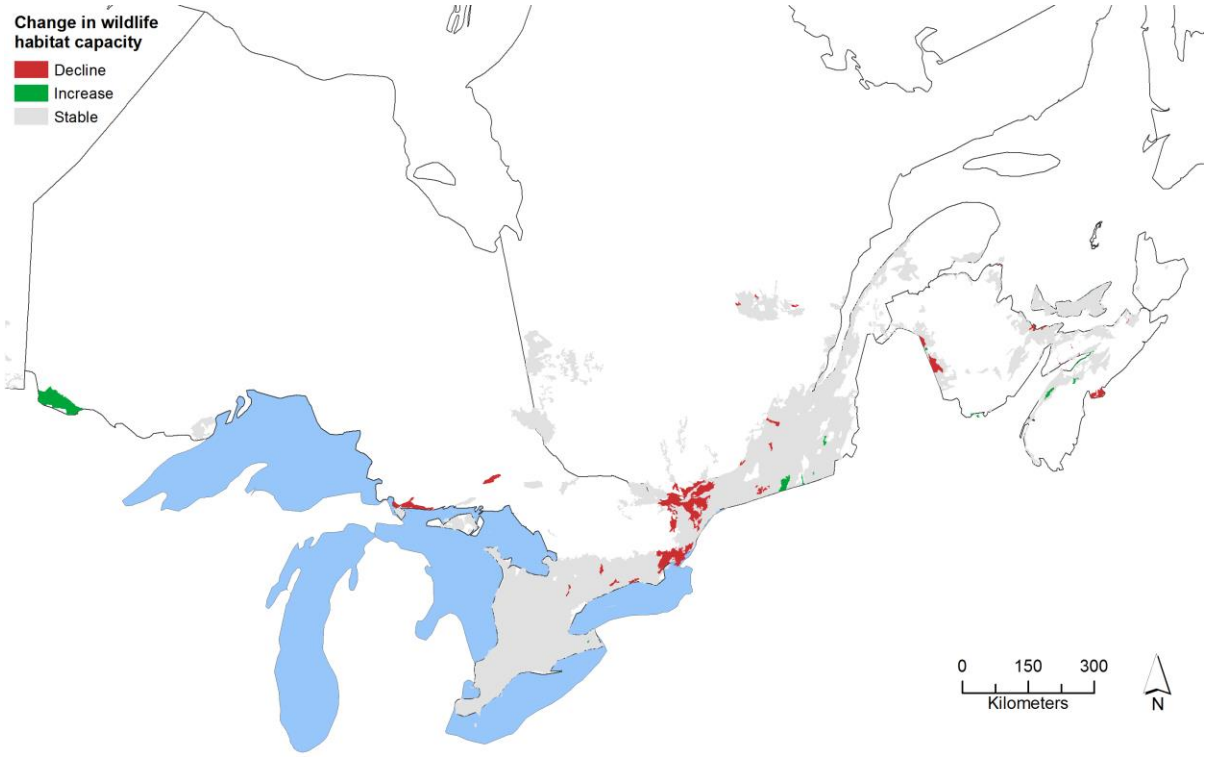
Source: Agriculture and Agri-Food Canada (2018).

Figure B.2. Change in wildlife habitat capacity, eastern Canada, 2011 to 2017



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Source: Agriculture and Agri-Food Canada (2018).

Annex C. Data tables for the figures presented in this document

Table C.1. Data for Figure 1. Index of wildlife habitat capacity on agricultural land, Canada, 2017

Wildlife habitat capacity 2017 (index)	Area of agricultural land (percentage)	Area of agricultural land (hectares)
Greater than 65 (higher)	7.7	6 998 738
60 to 65	8.2	7 490 491
55 to 60	10.6	9 632 358
50 to 55	12.0	10 987 840
45 to 50	8.0	7 304 613
40 to 45	8.2	7 465 877
35 to 40	8.4	7 634 744
30 to 35	11.9	10 841 019
25 to 30	15.9	14 501 971
20 to 25	7.6	6 958 307
Less than 20 (lower)	1.6	1 418 923
Total	**100**	**91 234 881**

Note: Habitat capacity is measured as the ability of the landscape to support breeding and feeding for wild terrestrial vertebrates (see methods).
Source: Agriculture and Agri-Food Canada (2018).

Table C.2. Data for Figure 2. Change in wildlife habitat capacity on agricultural land, Canada, 2011 to 2017

Region	Area of increase (percentage)	Area stable (percentage)	Area of decline (percentage)
Western Canada	3.8	93.7	2.5
Eastern Canada	2.0	92.6	5.4
National	**3.4**	**93.5**	**3.1**

Source: Agriculture and Agri-Food Canada (2018).

Additional information can be obtained at:

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